



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/621,260

07/16/2003

Rong Xiao

MS1-1528US

9728

22801

7590

06/11/2008

LEE & HAYES PLLC

421 W RIVERSIDE AVENUE SUITE 500

SPOKANE, WA 99201

EXAMINER

YUAN, KATHLEEN S

ART UNIT

PAPER NUMBER

2624

MAIL DATE

DELIVERY MODE

06/11/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/621,260	<b>Applicant(s)</b> XIAO ET AL.	
	<b>Examiner</b> KATHLEEN S. YUAN	<b>Art Unit</b> 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 March 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-68 is/are pending in the application.
- 4a) Of the above claim(s) 2-25,32-40,42,46-50,52-54,56,60-66,68 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,26-31,41,43-45,51,55,57-59 and 67 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

The response received on 3/8/2008 has been placed in the file and was considered by the examiner. An action on the merit follows.

#### ***Response to Amendment***

1. The amendments filed on 8 March 2008 have been fully considered. Response to these amendments is provided below.

#### **Summary of Amendment/ Arguments and Examiner's Response:**

2. The applicant has amended in that the post filter stage includes image pre-processing, a color filter process, and a SVM filter.

3. The applicant argues that Viola does not teach the boosting chain as claimed. "The subject matter of Claim 1, on the other hand, describes a boosting chain that is adopted to combine boosting classifiers within a hierarchy 'chain' structure," (page 20 of the arguments) which the applicant states Viola does not teach.

4. The examiner disagrees. Perhaps Viola does not teach the exact boosting chain of the applicant's invention; however, the applicant does not claim such a boosting chain. The claim simply states that "initial candidate portions of digital image data" is preprocessed in a boosting filter stage that uses a boosting chain, and produces intermediate candidate portions, which Viola does, as explained in the previous rejection and below.

5. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

6. Furthermore, the applicant has amended claim 4 to depend on withdrawn claim 2. Therefore, claims 4-8 are withdrawn because they depend on a withdrawn claim, and are not treated because they are non-elected. It is noted, however, that if they were treated, they can still be rejected on the prior art of the previous rejection dated 11/2/2007 and also on the prior art of the rejections for similar claims below.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 26-31, 41, 43-45, 51, 55, 57-59 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over “Robust Real-Time Object Detection” (Viola et al) in view of “A Subspace Approach to Face Detection with Support Vector Machines” (Ai et al).

Regarding claim 1, Viola et al discloses a method for use in detecting faces within a digital image (page 1, paragraph 2, lines 2-3), the method comprising: processing a set of initial candidate portions that are “integral images”, of digital image data, in a boosting filter stage that uses a boosting chain (fig on page 12), or interpreted as each stage as part of a chain, carried out by AdaBoost to produce a set of intermediate candidate portions (page 2, paragraph 4); and processing said set of intermediate candidate portions in a post-filter stage to produce a set of final candidate

portions, “promising regions” (page 2, paragraph 5). The post filter stage is more complex processing of finding a face (page 2, paragraph 5)

Viola does not disclose expressly that more complex processing to find a face includes an image pre-processing process, a color-filter process, and a support vector machine process.

Ai et al discloses a way of finding a face includes an image pre-processing process: creating a skin color model or training images, etc (fig. 1), a color-filter process (fig. 1, “Skin color segmentation), and an SVM process (fig. 1, “Linear SVM classifier”).

Viola et al and Ai et al are combinable because they are from the same field of endeavor, i.e. facial image detection.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the process of pre-processing, color-filtering, and SVM to detect faces.

The suggestion/motivation for doing so would have been to provide the most robust method by providing an easier and efficient way to find faces.

Therefore, it would have been obvious to combine the boosting chain of Viola with the face detection of Ai et al to obtain the invention as specified in claim 1.

Regarding claim 41, Viola et al discloses a computer-readable medium having computer-implementable instructions for causing at least one processing unit to perform acts comprising: detecting possible human face image data within a digital image (page 1, paragraph 2, lines 2-3) using a multiple stage face detection scheme (page 2) that includes at least a boosting filter stage configured to process a set of initial candidate

portions of digital image data using a boosting chain carried out by AdaBoost to produce a set of intermediate candidate portions (page 2, paragraph 4), and a post-filter stage configured to process said set of intermediate candidate portions to produce a set of final candidate portions, “promising regions” (page 2, paragraph 5). The post filter stage is more complex processing of finding a face (page 2, paragraph 5). Viola does not disclose expressly that more complex processing to find a face includes an image pre-processing process, a color-filter process, and a support vector machine process. Ai et al discloses a way of finding a face includes an image pre-processing process: creating a skin color model or training images, etc (fig. 1), a color-filter process (fig. 1, “Skin color segmentation), and an SVM process (fig. 1, “Linear SVM classifier”).

9. Regarding claim 51, Viola et al discloses an apparatus comprising logic operatively configured to detect at least one human face within a digital image (page 1, paragraph 2, lines 2-3) using a multiple stage face detection process (page 2) that includes at least a boosting filter stage configured to process a set of initial candidate portions of digital image data using a boosting chain carried out by AdaBoost to produce a set of intermediate candidate portions (page 2, paragraph 4), and a post-filter stage configured to process said set of intermediate candidate portions to produce a set of final candidate portions, wherein at least one of said final candidate portions includes detected face image data, “promising regions” (page 2, paragraph 5).

10. Claim 55 is rejected for the same reasons as claim 41. Thus, the arguments analogous to that presented above for claim 41 are equally applicable to claim 55.

Claim 55 distinguishes from claim 41 only in that claim 55 claims an apparatus and logic

operatively configured to do the steps of claim 41. Since a computer readable medium having computer-implemental instructions is an apparatus and the logic is disclosed in Viola (page 2, pp. 3-4), prior art applies.

11. Regarding claim 26, Viola et al discloses processing said plurality of portions using a pre-filter stage that is configured to output said set of initial candidate portions selected from said plurality of portions based on at least one feature, a Haar- like feature (page 2, paragraph 3); therefore, Viola et al employs a feature-based algorithm in a prefilter stage.. Furthermore, the entire process uses many feature-based algorithms (page 3, paragraph 5).

12. Regarding claim 27, Viola et al discloses that at least one feature based algorithm uses Haar-like features (page 4, paragraph 2).

13. Regarding claim 28, Viola et al discloses that at least one feature-based algorithm uses extended features (fig. 1, D, which corresponds to fig. 12c of the applicant's specification which is extended features).

14. Regarding claim 29, Viola et al discloses at least one feature-based algorithm uses mirror invariant features (fig. 1, c, which corresponds to fig. 12e of the applicant's specification of mirror invariant features).

15. Regarding claim 30, Viola discloses that an extra constraint of the mirror invariant, the 2<sup>nd</sup> white box in fig. 1, is added to reduce the size of a feature set associated with the mirror invariant features, )page 4, paragraph 2).

16. Regarding claim 31, Viola et al discloses at least one feature-based algorithm uses variance features (fig. 1, A, which corresponds to fig. 12h of the applicant's specification of variance features.)

17. Regarding claims 43 and 57, Viola et al discloses processing said plurality of portions using a pre-filter stage that is configured to output said set of initial candidate portions selected from said plurality of portions based on at least one feature, a Haar-like feature (page 2, paragraph 3).

18. Regarding claims 44 and 58, Viola et al discloses that the feature is a Haar-like feature (page 2, paragraph 3, lines 3-4).

19. Regarding claims 45 and 59, by reinterpreting the pre-filter stage of Viola et al as being the first part "the integral image" (page 2, paragraph 3) and also part of the AdaBoost procedure as well from page 2, paragraph 4 and figure 6, items 1 and 2, the boosting chain step will be interpreted as the rest of the AdaBoost procedure that is not part of the pre-filter stage (fig. 6, item 3), and the post filtering stage is the "further processing" of fig. 6. Therefore, Viola et al discloses that the pre-filter stage includes a linear filter, since items 1 and 2 are filtering out rejections and are arranged in a linear fashion. The filter is based on a weak learner (page 12, paragraph 1).

20. Regarding claims 51 and 67, Viola et al employs a feature-based algorithm in a prefilter stage (page 2, paragraph 3) and the feature includes a Haar-like feature (page 2, paragraph 3, lines 3-4).

### ***Conclusion***



21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KATHLEEN S. YUAN whose telephone number is (571)272-2902. The examiner can normally be reached on Monday to Thursdays, 9 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571)272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2624

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bhavesh M Mehta/  
Supervisory Patent Examiner, Art Unit 2624

KY  
6/4/2008